E and D-1 (You may use material up through Section SD)

Suppose that $A$ is a square matrix that is equal to its inverse, $A = A^{-1}$.

1. Prove that the only possible eigenvalues of $A$ are $\lambda = 1$ and $\lambda = -1$.

2. Give an example of a $3 \times 3$ non-diagonal matrix that is equal to its inverse and has both 1 and $-1$ as eigenvalues.